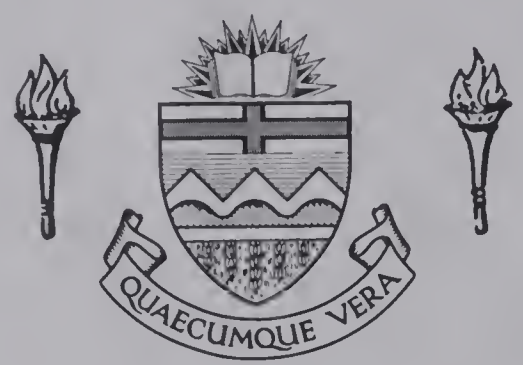




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THE UNIVERSITY OF ALBERTA

# HIGH SCHOOL BOOKKEEPING AND OTHER SELECTED FACTORS AS PREDICTORS OF SUCCESS IN ELEMENTARY ACCOUNTING AT THE UNIVERSITY OF ALBERTA

by

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A THESIS

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The undersigned hereby certify that they have read and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "High School Bookkeeping and Other Selected Factors as Predictors of Success in Elementary Accounting at the University of Alberta," submitted by Melvin M. Kuefler in partial fulfillment of the requirements for the degree of Master of Education.

## ABSTRACT

Educators have the responsibility of assisting students in selecting high school programs to suit their vocational choice. Will students who have completed bookkeeping courses in high school achieve higher marks in elementary accounting at university than those who have not received such prior instruction? Which of the grade twelve departmental subjects are the best predictors of success in university elementary accounting? Answers to these questions constitute the purpose of this study.

The population consisted of those students (824) who had completed Accounting 200 at the University of Alberta during the five-year period June, 1959 to June, 1964 and for whom A.C.E. scores and high school marks were available.

The analysis of covariance method, utilized to partial out the effect of intelligence, was applied to determine whether students who had received high school bookkeeping instruction achieved higher marks in Accounting 200 than did students who had not received such instruction. The results indicated that students with one or more years of high school bookkeeping instruction achieved significantly higher marks in Accounting 200 on both mid-session and final marks than did students without prior high school bookkeeping instruction.

The stepwise multiple regression technique was applied to determine the best predictors of the Accounting 200 mid-session and final marks from the following: Bookkeeping 20, Accounting 30, A.C.E., English 30, Social Studies 30, Mathematics 30, Foreign Language 30,

Science 30 Average and Five-Departmental Average. The following three runs were made: the first included all predictors (N was 12); the second included all predictors except Accounting 30 (N was 91); the third included all predictors except Bookkeeping 20 and Accounting 30 (N was 755). In the third run Mathematics 30 was selected as the best predictor followed by Social Studies 30, A.C.E., and Science 30 Average. These four were selected as the significant predictors for the Accounting 200 mid-session mark and were again selected for the Accounting 200 final mark in the same relative positions.

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Appreciation is also extended to Dr. E. W. Buxton and Mr. D. Goodale for their helpful criticisms and comments and to Dr. S. Hunka, Mr. J. Carlson and Mr. W. Muir for assistance in processing the data by computer.

To my wife, Aimee, and to my children I express my gratitude for their patience and understanding.

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# CHAPTER I

## INTRODUCTION

### STATEMENT OF THE PROBLEM

Over the years educators have been confronted with the problem of guiding students in the selection of high school subjects which will better prepare them for university entrance. Although some students know precisely which high school courses they wish to take, many others look to teachers, administrators and guidance counsellors for assistance.

High school students who anticipate enrolling in Business Administration or Commerce at university would frequently select business courses in high school if these courses would benefit them in their later university work. Accordingly, they are interested in knowing the effect, if any, of high school bookkeeping upon achievement in accounting courses at university.

Will students who have taken bookkeeping in high school achieve better marks in accounting at university than those who have not taken bookkeeping in high school? What are the better predictors of success in university accounting from among the grade twelve matriculation subjects? The present study should provide statistical data to answer these questions.

### NEED FOR THE STUDY

Before initiating this study the investigator sought the

opinions of first-year university accounting students, university accounting instructors and high school bookkeeping teachers regarding the effect of prior bookkeeping instruction upon students' success in university accounting.

Thirty-one of 176 first-year accounting students at the University of Alberta in 1964 reported that they had completed at least one bookkeeping course in high school. Twenty-two of the thirty-one students indicated that high school bookkeeping instruction had been of assistance to them in their study of university accounting.

Three of the four University of Alberta accounting instructors who were interviewed by the researcher stated that they could see little difference in achievement between those accounting students who had taken bookkeeping in high school and those who had not taken bookkeeping. In a survey of eighty-five college accounting instructors, Donaldson, as reported by Barbour,[1] asked the following question: "Do you think students who have had bookkeeping do better work in accounting than those who have not?" Thirty-nine instructors replied "no" and thirty-seven replied "yes." Fourteen instructors thought the students who had studied bookkeeping did better during the first part of the year but had no advantage over other students after that time.

Of the sixty high school teachers attending the Spring Business Education Conference[2] held at Edmonton in 1965, only three estimated

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[1]Edna H. Barbour, "The Effect of the Study of High School Bookkeeping upon Achievement in Elementary Accounting," (unpublished Ph.D. thesis, Ohio State University, Columbus, 1955), p. 28.

[2]This conference was sponsored by the Business Education Specialist Council of the Alberta Teachers Association.

that high school bookkeeping was of no value to students prior to the study of university accounting. The remainder believed that high school bookkeeping instruction was of assistance to future university accounting students.

In addition to the above opinions the views of several prominent educators in the United States were considered. Lanham said:

> College teachers of accounting often believe that students who have had high school bookkeeping are handicapped in their first-year accounting courses because the unlearning process is harder than the learning process.[3]

Lanham's view, however, was not supported by research evidence.

Howard,[4] however, after surveying all the accounting teachers in the state of Michigan, concluded that high school bookkeeping was of substantial benefit to students taking college accounting. Howard had postulated that the undesirable aspect to prior bookkeeping was that these students tend to use and understand in a superficial way only, a specific pattern of entries and account titles. This familiarity without understanding he surmised, is a hindrance when attempting to learn theory.

Another educator, Bower, declared that:

> When a student who has had bookkeeping in high school arrives at a college or university and enrolls in the first course in accounting, he has a substantial advantage over others without previous instruction. This advantage

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[3]James S. Lanham, "Should Bookkeeping Be Taught to College Bound Students?" Business Education Forum, Volume 12, (December, 1957), p. 7.

[4]Alva Howard, "The Relation of High School Bookkeeping to College Accounting," The Balance Sheet, (October, 1963), p. 69.

> generally is short-lived or can later turn out to be a disadvantage, because this individual with the high school bookkeeping background may become over confident and fall behind the progress being made by the remainder of the class.[5]

The divergent views expressed by the accounting students, accounting instructors, bookkeeping teachers and journal contributors indicate a need for evidence based on research. The present study attempts to answer the following general questions:

1. Do students who have received one or more years of bookkeeping instruction in high school achieve higher marks in Accounting 200 than students who have not received bookkeeping instruction in high school?

2. From among a number of high school matriculation subjects which are the best predictors of success in Accounting 200?

## HYPOTHESES

The hypotheses are divided into two sections: Part A includes those relating to the achievement of accounting students with or without prior bookkeeping instruction; Part B includes those pertaining to the selection of predictors.

PART A

1 (a) There is no significant difference in the adjusted Accounting 200 mid-session marks between students who have had one or more years of bookkeeping instruction in high school and

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[5] James B. Bower, "Preparation for Advanced Study in Accounting," Business Education Forum, (December, 1962), p. 10.

students who have had no bookkeeping instruction in high school.

1 (b) There is no significant difference in the adjusted Accounting 200 final marks between students who have had one or more years of bookkeeping instruction in high school and students who have had no bookkeeping instruction in high school.

2 (a) There is no significant difference in the adjusted Accounting 200 mid-session marks between students who have had one year of bookkeeping instruction in high school and students who have had no bookkeeping instruction in high school.

2 (b) There is no significant difference in the adjusted Accounting 200 final marks between students who have had one year of bookkeeping instruction in high school and students who have had no bookkeeping instruction in high school.

3 (a) There is no significant difference in the adjusted Accounting 200 mid-session marks between students who have had two years of bookkeeping instruction in high school and students who have had no bookkeeping instruction in high school.

3 (b) There is no significant difference in the adjusted Accounting 200 final marks between students who have had two years of bookkeeping instruction in high school and students who have had no bookkeeping instruction in high school.

4 (a) There is no significant difference in the adjusted Accounting 200 mid-session marks between students who have had two years of bookkeeping instruction in high school and students who have had one year of bookkeeping instruction in high school.

4 (b) There is no significant difference in the adjusted Accounting 200 final marks between students who have had two years of bookkeeping instruction in high school and students who have had one year of bookkeeping instruction in high school.

PART B

5 (a) Including Bookkeeping 20 and Accounting 30 as predictors, there is no significant correlation, at the .05 level, between the Accounting 200 mid-session mark and marks in the following:

(1) A.C.E.
(2) Bookkeeping 20
(3) Accounting 30
(4) English 30
(5) Social Studies 30
(6) Mathematics 30
(7) Foreign Language 30
(8) Science 30 Average
(9) Five-Departmental Average

5 (b) Including Bookkeeping 20 and Accounting 30 as predictors, there is no significant correlation, at the .05 level, between the Accounting 200 final mark and marks in the following:

(1) A.C.E.
(2) Bookkeeping 20
(3) Accounting 30
(4) English 30
(5) Social Studies 30
(6) Mathematics 30
(7) Foreign Language 30
(8) Science 30 Average
(9) Five-Departmental Average

6 (a) Excluding Accounting 30 as a predictor, there is no significant correlation, at the .05 level, between the Accounting 200 mid-session mark and marks in the following:

(1) A.C.E.
(2) Bookkeeping 20
(3) English 30
(4) Social Studies 30
(5) Mathematics 30
(6) Foreign Language 30
(7) Science 30 Average
(8) Five-Departmental Average

6 (b) Excluding Accounting 30 as a predictor, there is no significant correlation, at the .05 level, between the Accounting 200 final mark and marks in the following:

(1) A.C.E.
(2) Bookkeeping 20
(3) English 30
(4) Social Studies 30
(5) Mathematics 30
(6) Foreign Language 30
(7) Science 30 Average
(8) Five-Departmental Average

7 (a) Excluding Bookkeeping 20 and Accounting 30 as predictors, there is no significant correlation, at the .05 level, between the Accounting 200 mid-session mark and marks in the following:

(1) A.C.E.
(2) English 30
(3) Social Studies 30
(4) Mathematics 30
(5) Foreign Language 30
(6) Science 30 Average
(7) Five-Departmental Average

7 (b) Excluding Bookkeeping 20 and Accounting 30 as predictors, there is no significant correlation, at the .05 level, between the Accounting 200 final mark and marks in the following:

(1) A.C.E.
(2) English 30
(3) Social Studies 30
(4) Mathematics 30
(5) Foreign Language 30
(6) Science 30 Average
(7) Five-Departmental Average

## DELIMITATIONS

1. No attempt was made in this study to determine the reason for the contribution or non-contribution of high school bookkeeping to achievement in Accounting 200.
2. Although other factors such as age and sex may affect achievement in Accounting 200, these factors were not considered in the present study.

## DEFINITION OF TERMS

High School Bookkeeping: This refers to the bookkeeping courses available in Alberta high schools. Prior to September 1, 1965 these courses were Bookkeeping 20 and Accounting 30.

Bookkeeping 20: For purposes of the study this is the name used to designate the first course in high school bookkeeping in Alberta high schools. This non-matriculation course was usually offered to grade eleven or twelve students. (Since September 1, 1965 this course is called Bookkeeping 10 and may be offered to grade ten students.)

Accounting 30: For purposes of the study this is the name used to designate the second course in bookkeeping in Alberta high schools. This non-matriculation course was offered to grade twelve students who had obtained a "B" or better in Bookkeeping 20. (Since September 1, 1965 this second course in high school bookkeeping is called Bookkeeping 20 and may be offered to grade eleven students.)

Elementary Accounting: This refers to the first course in accounting that is offered at the university or college level.

Accounting 200: This is the first course in Accounting that is offered at the University of Alberta, Edmonton.

Adjusted Accounting 200 Mark: This mark would be either the final mark or mid-session mark in Accounting 200 after the statistical correction had been applied to nullify a difference in intelligence scores.

English 30, Social Studies 30 and Mathematics 30: These are matriculation subjects offered to grade twelve students in Alberta high schools. The Department of Education provides uniform province-wide examinations for these courses.

Foreign Language 30: This term is used to designate any one of French 30, Latin 30, German 30 or Ukrainian 30. These courses are grade twelve matriculation courses.

Science 30 Average: This is the student's average for two or three of the following matriculation departmental subjects: Chemistry 30, Physics 30 and Biology 30.

Five-Departmental Average: This term is used to designate the average of a student's final marks in English 30, Social Studies 30, Mathematics 30, Foreign Language 30 and Science 30 Average.

A.C.E.: This is the American Council on Education Psychological Examination for College Freshmen, 1949 edition. The score used is the sum of the verbal mark and the quantitative mark achieved by the student on the test. The test is designed to measure intelligence.

# CHAPTER II

## REVIEW OF RELATED LITERATURE

In the review of related literature, studies that attempted to predict freshman success at the University of Alberta are considered initially. These are followed by American studies that refer either to the selection of predictors of college elementary accounting or to an examination of the effect of prior bookkeeping instruction upon success in university.

A study conducted in 1959 by Zurowsky[1] at the University of Alberta involved the selection of predictors of success in seven science and two commerce courses with 529 freshmen as the population. Zurowsky considered four approaches: determining the best combination of grade nine variables, the best combination of grade twelve variables, the best combination of aptitude test and Cooperative English Test scores, and the best combination of grade twelve and grade nine variables. Zurowsky's task was to determine the optimum combination of variables for prediction of freshman success in the selected university courses, one of which was Accounting 200. The correlations with Accounting 200 were as follows: grade twelve science average .616, grade nine mathematics .496, grade twelve social studies .488, grade twelve mathematics .480, grade twelve foreign language average .345, and S.C.A.T. Quantitative .363. Zurowsky concluded that the

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[1]John Zurowsky, "Predicting Freshman Success in Seven Science and Two Business Administration Courses at the University of Alberta," (unpublished Master's thesis, University of Alberta, Edmonton, 1959).

grade twelve science average was the best predictor of Accounting 200. Because of the small number of students in Accounting 200--only 31--the usefulness of this finding must be questioned.

In a study of thirty freshmen subject areas, Black[2] found that the grade twelve science average, with a correlation of .632, was the best predictor of the university freshmen average. Black developed a university freshmen prediction profile chart which he hoped guidance counsellors would use and which he validated six years later on the 1962 freshmen engineering class.[3]

Mack[4] studied the success of the total first year student population of the 1960-61 class at the University of Alberta. His premise was that prediction studies in the past had not provided information in suitable form for use by guidance counsellors. Mack summarized the results of eighteen studies that were done in North America using A.C.E. scores and high school averages as predictors. He reported correlation coefficients ranging from .19 to .58 for A.C.E. and concluded that the value of A.C.E. as a predictor should be questioned. Mack suggested that multiple correlations might prove better. Accordingly, he took the high school averages of the 1960-61 class, charted

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[2]Donald B. Black, "The Prediction of Freshman Success in the University of Alberta From Grade XII Departmental Results," Alberta Journal of Educational Research, Volume VI, (March, 1960), p. 43.

[3]Donald B. Black, "Validity of Regression Equations After Six Years To Predict Freshman Success In Engineering," Alberta Journal of Educational Research, Volume X, (September, 1964), p. 135.

[4]Lawrence L. Mack, "Examining the Efficiency of Predictors Presently Being Used at the University of Alberta," Alberta Journal of Educational Research, Volume IX, (June, 1963), p. 109.

them into five faculty groupings and then divided those in each faculty grouping into seven levels based on high school average. Mack expected that educators would use his chart to predict success at the University of Alberta more effectively.

Knowles,[5] in 1964 at the University of Alberta, attempted to determine if sex, faculty, or size of high school influenced academic success of freshmen. He employed the stepwise multiple regression technique, and observed, as did Zurowsky and Black, that the grade twelve science average was a major contributor to the prediction batteries. Knowles detected that the mark in mathematics made a sizeable contribution to prediction in the Faculty of Engineering.

In 1951 Herring[6] summarized 242 studies in high school bookkeeping and college accounting and reported that many researchers found that students' general scholastic average of their freshman subjects offered the greatest predictive possibilities. The findings of more recent studies, Herring stated, seemed to indicate that not one factor but a combination of many factors--traits, ambitions, interest, home environment, and occupational and family background--influenced achievement in high school bookkeeping and college

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[5]Donald W. Knowles, "The Influence of Faculty, High School Size, and Sex in the Prediction of Freshman Success Using Departmental and Principals' Rating Grade XII Scores," (unpublished Master's thesis, University of Alberta, Edmonton, 1964).

[6]Virgil J. Herring, "Research in Teaching Bookkeeping and Accounting," Journal of Business Education, Volume 26, (May, 1951), p. 381.

accounting. In 1953, Herring[7] reported that the findings of research studies dealing with the effects of instruction in high school bookkeeping upon students' achievement in college accounting disclosed that the students who had studied high school bookkeeping made better marks in elementary accounting than did those students who had not studied high school bookkeeping. In addition, he stated that students who had studied bookkeeping in the senior year of high school achieved more readily in the college elementary accounting courses than did those students who had studied bookkeeping in the sophomore and junior years of high school. This was not supported by the findings of Barbour[8] who reported that the length of time between the study of high school bookkeeping and the study of college accounting was not a significant factor.

Devine,[9] in 1960, summarized 185 research reports and 478 articles. One of his conclusions was that no factor or combination of factors was found to be predictive of success in high school bookkeeping and college accounting.

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[7]Virgil J. Herring, "Research Findings Relative to Students Achievement in Bookkeeping and Accounting," Business Education Forum, Volume 8, (October, 1953), p. 31.

[8]Edna H. Barbour, "The Effect of the Study of High School Bookkeeping upon Achievement in Elementary Accounting," (unpublished Ph.D. thesis, Ohio State University, Columbus, 1955), p. 198.

[9]John W. Devine, "A Comprehensive Analysis, Classification, and Syntheses of Research Findings and Thought on the Teaching of Bookkeeping and Accounting, 1950-1960," The Journal of Business Education, Volume 39, (October, 1963), p. 30.

Zacur[10] studied the causes of dropouts from accounting courses at the University of Miami and observed that students who had taken high school bookkeeping were able to achieve better marks in college accounting than those who had not. Zacur recommended that accounting students who have had high school bookkeeping be separated in college elementary accounting from accounting students who have not had bookkeeping. He also recommended that a special program in accounting courses be considered for students of low ability or low scholarship who would not earn an undergraduate degree.

In 1961, Anderson[11] sought to determine the relative effectiveness of high school bookkeeping, shorthand, English and social studies in predicting college success. Her population consisted of students who attended the University of Toledo from 1950 to 1959 in (a) The College of Arts and Science and (b) The College of Business Administration. The population consisted of 358 graduates who were included in at least one of the following groups:

1. At least one year of high school bookkeeping,
2. At least one year of high school shorthand,
3. At least two years of high school bookkeeping,
4. At least two years of high school shorthand,

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[10]Howard A. Zacur, "A Study of Causes of Drop-Outs From Accounting Courses at the University of Miami," The Journal of Business Education, Volume 28, (February, 1953), p. 206.

[11]Esther E. Anderson, "The Effectiveness of High School Bookkeeping and Shorthand Grades as Indicators of College Success," (unpublished Ph.D. thesis, New York University, New York, 1961).

5. At least one year of high school bookkeeping plus one year of high school shorthand.

From her analysis of the data, Anderson concluded the following:

1. Neither the English Index[12] nor the Shorthand Index can be considered an effective measure of over-all prediction of college achievement.

2. The Shorthand Average fails to show a significant relationship to college achievement under any predictive pattern examined.

3. The consistency with which the Bookkeeping Average and the Bookkeeping Index show predictive effectiveness in all pertinent samples tested.

4. The Social Studies Index as an indicator of college achievement is more effective than any of the other indexes examined.[13]

Aase[14] developed multiple regression equations for the prediction of academic success in elementary accounting at the Chico State College in 1959. He employed high school records, freshmen college test scores and grades in required college freshmen courses to predict grades in elementary accounting. The students enrolled from 1956 to 1958 were included in the study. Because of the relatively small number in his population (134) and because only a small percentage of these had prior bookkeeping, this factor was deleted from his

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[12] Index represents the arithmetic average of more than one year's work in a subject matter used.

[13] Anderson, op. cit., p. 205.

[14] Donald A. Aase, "The Development of Multiple Regression Equations for the Prediction of Academic Success in Elementary Accounting at the Chico (California) State College," (unpublished Ph.D. thesis, University of North Dakota, Grand Forks, 1959).

investigation. Because elementary accounting was taken only in the sophomore year at Chico State College, Aase had available a variety of first year factors to choose from in his analysis. High school algebra, high school English, total high school mathematics, college business mathematics, college English and freshmen grade-point average and A.C.E. Quantitative, Linguistic and total scores were applied as predictors. After making computations to obtain the predictors with the highest correlations, Aase proceeded to develop his multiple regression equation which used the A.C.E. Quantitative score, the college-freshman grade-point average and the college business mathematics grade-point average. The multiple correlation coefficient for this equation was .5669. Unfortunately, the validity of Aase's regression equation was not tested on a later group of students.

In an attempt to establish minimum requirements for accounting students at West Liberty State College, West Virginia, Landwehr,[15] in 1963, analyzed selected factors related to success in the study of college accounting. The relationships between certain entrance examinations and grades in ten different accounting courses were calculated. These entrance examinations were the A.C.E. Psychological Examination for College Freshmen, the Kelley-Greene Reading Comprehension Test and the Ayres Handwriting Scale. Landwehr also determined the relationship between grades received in beginning accounting

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[15]Bernard J. Landwehr, "An Analysis of Selected Factors Related To Success in the Study of College Accounting in an Attempt to Establish Minimum Requirements for Accounting Students at West Liberty State College," (unpublished Ed.D. thesis, University of Pittsburgh, Pittsburgh, 1963).

courses by analyzing the marks of 109 students who had completed Accounting I and Accounting II at West Liberty State. Questionnaires were sent to 216 colleges in an attempt to determine their prerequisites for accounting majors. Landwehr found that low or negligible relationships existed between the A.C.E. scores and the grades in all ten of the accounting courses used in the study. He obtained a correlation of -.17 between A.C.E. and Principles of Accounting I.[16] The Kelley-Greene Reading Comprehension Test and the Ayres Handwriting Scale did not correlate significantly with the criterion. Grades in the beginning accounting courses were the best predictors of success in subsequent accounting courses. In his introduction, Landwehr stated:

> An adequate means of identifying a student's ability to profit from the study of accounting would be helpful in establishing entrance requirements for those students who desire to enter college accounting, since the student who majors in accounting typically takes about one-fourth of his total hours of college work in the various accounting courses.[17]

Certainly Landwehr's view of the importance of identifying those students able to succeed in the study of accounting is correct, yet Landwehr failed to do that. He devoted the major portion of his statistical analysis to determining the relationship between success in early accounting courses and achievement in advanced accounting courses. One would expect a close relationship between accounting

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[16] Ibid., p. 26.

[17] Ibid., p. 3.

courses in the same university. Landwehr failed to present a proposal for identifying the student able to succeed in the first college accounting course.

In 1955 Royer[18] conducted an elaborate study in an attempt to predict achievement of students in first-semester accounting at the University of Miami. A base group of 1234 first-semester accounting students from the year 1950-1952 was selected. He determined the correlation of all predictor variables with the criterion and then established prediction equations which he validated on a test group of 444 accounting students for the years 1952-1953. This investigation of possible predictor variables was more thorough than any other examined by the researcher. The predictor variables were divided into the following three groups: freshman entrance tests, personal factors, and personality traits. The freshman entrance tests selected by Royer were: a locally constructed Arithmetic Test score, the A.C.E. Quantitative score and the A.C.E. Linguistics score. From a total of twenty-six personal factors Royer found some with significant correlations and used these in a regression equation. The following are the factors he chose: bookkeeping in high school, age, educational objective, marital status, number and types of jobs involving accounting, rank in high school graduating class, veteran status, and work experience involving accounting. Of the ten personality traits investigated,

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[18] J. Everett Royer, "Selection and Use of Certain Factors Significant in First-Semester Accounting at the University of Miami, 1950-1953," (unpublished Ed.D. thesis, Indiana University, Bloomington, 1955).

nine were correlated significantly with the criterion and these were selected for use in a regression equation. These nine factors were attitude towards work, dependability, general ability, independence of mind, intellectual interest, perseverance, probability of success in college, study habits and work habits.

Prior bookkeeping instruction, one of the factors selected by Royer, has particular relevance to the present study. Royer found that the achievement of the 197 students who had taken one year of instruction in high school bookkeeping and the thirty-two students who had taken two years of instruction in high school bookkeeping was significantly different from that of the base group, as evidenced by t values of 3.64 and 4.90 respectively. These t values were significant beyond the .01 level. In comparing the A.C.E. mean of the non-bookkeeping group with the A.C.E. mean of the bookkeeping group, Royer found the difference not significant. Royer then set up a regression equation to include the following: a composite score of the eight personal factors, another composite score of the nine personality traits, and the scores on A.C.E. Quantitative, A.C.E. Linguistics, and the Arithmetic Test. Correlation coefficients for each of the five variables with the criterion were as follows: composite scores of personal factors .393; the composite score of personality traits .257; the A.C.E. Quantitative .313; the A.C.E. Linguistics .222; and the Arithmetic Test .399. The multiple correlation of the five variables with the criterion was .518.

The prediction equation developed by Royer was $Y = .09 + .02X_1 + .002X_2 + .035X_3 + .014X_4 + .022X_5$ where Y was the predicted mark, $X_1$

was the A.C.E. Quantitative score, $X_2$ was the A.C.E. Linguistics score, $X_3$ was the Arithmetic Test score, $X_4$ was the composite score of personal factors, and $X_5$ was the composite score of personality traits. When Royer applied his equation to a test group he found that the predicted mark agreed with the actual mark for 24.3 per cent of the students and that the predicted mark was within one letter mark of the actual mark for 72.0 per cent of the students. The problem with Royer's equation is that to obtain an index to grade each student for the personal factors and personality traits would be difficult and time-consuming.

In an attempt to predict academic success in accounting, Larson[19] in 1957, analyzed the records of freshmen accounting students at East Carolina College. The four multiple regression equations developed included one from past school records and one from freshman placement tests to provide two for men and two for women. Larson[20] discovered that sixty-one per cent of the men who had instruction in high school bookkeeping earned superior grades of one and two and that twelve per cent of them earned inferior grades of four and five. Of the men who had not had bookkeeping instruction twenty-one per cent earned superior grades and fifty-two per cent earned inferior grades. Of the women who had previous bookkeeping instruction forty-seven

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[19]Tora M. Larson, "A Study of Student Personnel Records at East Carolina College as Related to Prediction in Elementary Accounting," (unpublished Ph.D. thesis, University of Minnesota, Minneapolis, 1957).

[20]Ibid., p. 301.

per cent earned superior grades and twenty-four per cent earned inferior grades. Of the women who had not had bookkeeping, twenty-eight per cent earned superior grades and forty-eight per cent earned inferior grades. The predictor factors carried different relative weights for the sexes. Prior bookkeeping instruction, business mathematics grade and the A.C.E. Quantitative score carried greater relative weight for the men. First quarter quality point ratio, Reading Comprehension score and Introduction to Business grade carried greater relative weight for the women.

Larson[21] concluded that Introductory Accounting scores were predicted with more accuracy from school records than from test records, and that no significant difference existed in the achievement of the men and the women enrolled in Introductory Accounting for the first time at East Carolina College. Larson[22] suggested that because fifty per cent of the students in her pilot group with no prior bookkeeping instruction did unsatisfactory work, the university authorities might consider separating the students enrolled in Introductory Accounting on the basis of whether or not they had received previous bookkeeping instruction.

Barbour[23] in 1955, investigated the effect of high school bookkeeping on achievement in college accounting. She collected data for first-semester accounting students from several colleges. From this

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[21] Ibid.

[22] Ibid.

[23] Barbour, op. cit., p. 163.

group she chose sixty-six couples matched on the basis of intelligence, age, sex, college units completed, high school and college mathematics courses and high school and college grade averages. The main difference was that one student in each couple had studied bookkeeping in high school and the other student had not.

Barbour[24] observed that the mean grade in first-semester accounting for the sixty-six students who had studied bookkeeping was 3.90. For the students who had not studied bookkeeping it was 3.08. This difference was highly significant. Barbour also noted a significant difference between the means of the bookkeeping and non-bookkeeping students' second-semester accounting grades. The correlation between high school bookkeeping grades and first-semester accounting grades was .826. Barbour concluded that students who make a grade of A or B in bookkeeping are almost certain to make a C grade or above in first-semester accounting.[25] However, students who had taken two years of bookkeeping did not appear to have any advantage over students who had taken one year, she reported.[26]

Whiteman[27] studied the effect of a background in college business mathematics and high school bookkeeping upon success in college

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[24] Ibid., p. 216.

[25] Ibid., p. 231.

[26] Ibid.

[27] Floyd E. Whiteman, "A Study of the Effect of a Background in College Business Mathematics and High School Bookkeeping upon Success in College Elementary Accounting," (unpublished Master's thesis, Kansas State Teachers College, Emporia, 1963).

elementary accounting. Whiteman found that a background in high school bookkeeping is helpful in achieving success in college elementary accounting and that the number of years of high school bookkeeping which a student has completed tends to be directly related to his degree of success in college elementary accounting. This second conclusion was determined by examining the records of only fourteen students who had completed one or more years of high school bookkeeping. Whiteman stated that it makes very little difference whether or not a student takes college business mathematics, as students actually received a mean grade of .01 grade points higher if they had not studied college business mathematics as compared with students taking the course prior to enrolling in college elementary accounting.

Thiege,[28] in determining the prognostic value of high school bookkeeping to elementary accounting, analyzed the records of 417 students at Fresno State College. The accounting grade averages of the students having a knowledge of bookkeeping were significantly higher than those not having this background. In making these comparisons, relative aptitudes based upon A.C.E. tests were considered. Thiege found that seventy-two per cent of those who excelled in bookkeeping in high school also received an A or B in college accounting. Of the students who received a C in high school bookkeeping, twenty-five per cent were able to earn an above average mark in college accounting.

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[28] Jack E. Thiege, "An Analysis of the Prognostic Value of High School Bookkeeping to Elementary College Accounting," (unpublished Master's thesis, Fresno State College, Fresno, 1957).

Cannon[29] developed various multiple regression equations in an attempt to predict achievement in college elementary accounting. Variables that Cannon considered were sex, number of years of instruction and achievement in high school bookkeeping, number of years of instruction and achievement in high school and college mathematics beyond first-year algebra, the total score on the Scholastic Aptitude Test of the College Entrance Board, and the fifteen scales of the Edwards Personal Preference Schedule. The variables significant at the .05 level for all students were the S.C.A.T. total score, the weighted mathematics score, the weighted bookkeeping score and order (a scale of E.P.P.S.). For males, the variables significant were weighted mathematics, exhibition, (a scale of E.P.P.S.) with negative correlation, and weighted bookkeeping. For females, the only significant variable was the S.C.A.T. total score. The correlation coefficients for all students between achievement in accounting and the predictor variables were as follows: mathematics .299; S.C.A.T. .273; bookkeeping .184; and order .221. When the equations were applied to a test group the following year, the academic variables were consistent as predictors but the Edwards variables were not. Cannon concluded by recommending that business students obtain several mathematics courses in high school because it exceeded the contribution made by high school bookkeeping to college accounting in his study.

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[29]Harold L. Cannon, "Personality Characteristics and Other Factors as Predictors in Achievement in College Elementary Accounting," (unpublished Ph.D. thesis, University of Minnesota, Minneapolis, 1965).

The review of related literature indicates that a great many factors have been considered in attempting to predict achievement in college, and in particular, in college elementary accounting. The following factors were some of those considered: grade nine subjects, grade twelve subjects, university subjects, grade nine average, grade twelve average, university freshman average, personal factors, personality traits, A.C.E. Quantitative, A.C.E. Linguistic, Reading Comprehension, Ayres Handwriting and other college entrance tests. Certain factors were found to be valuable as predictors by some researchers, but there was no unanimity on the value of any one specific factor as a predictor of elementary accounting. Intelligence, as measured by A.C.E. scores was found by some to be significantly correlated with achievement but others disagreed. Some researchers found grade twelve science to be the best predictor; others found grade twelve social studies better; and still others found the grade twelve average or freshman average to be the best predictor. Several researchers found the mathematics, arithmetic or quantitative test score to be highly correlated with achievement in elementary accounting, whereas one researcher found that students without college business mathematics achieved higher marks in elementary accounting. Still other researchers proposed a composite score of several factors as the best predictor of success in elementary accounting. Despite the fact that many college accounting instructors stated that high school bookkeeping was either of no value, or detrimental to a student in his later study of university accounting, several researchers found evidence otherwise.

# CHAPTER III

# DESIGN AND PROCEDURE

## THE POPULATION

The population consisted of all students who had completed Accounting 200 at the University of Alberta during the five-year period, June 1959 to June 1964. Although there were 1106 students in this group, complete data were available for only 824 students.

## DATA COLLECTED

For each of the 1106 students included in the study, mid-session and final marks in Accounting 200 were obtained from the records of the University of Alberta. Both the mid-session mark and the final mark were used in the analysis because certain related literature had suggested that prior bookkeeping instruction would be of assistance only in the early part of the Accounting 200 course.

A.C.E. scores for 824 students were procured from the offices of the Student Counselling Service. Unfortunately, it was necessary to eliminate 282 students from the original population of 1106 because these scores were not available. A.C.E. scores were required for two reasons: firstly, to test their effectiveness as predictors of success in Accounting 200, and secondly, to make possible the neutralization of the covariate, intelligence, which is considered to affect achievement.

From the files of the Alberta Department of Education, student

final marks were obtained in Bookkeeping 20, Accounting 30, English 30, Social Studies 30, Mathematics 30, French 30, Latin 30, German 30, Physics 30, Chemistry 30 and Biology 30. These marks were used either singly or jointly in developing the predictors used in this study.

## TREATMENT OF THE DATA

An identification number was assigned to each of the 824 students and a deck of IBM cards was punched from the information sheets to permit processing by a computer.

The card lay-out is illustrated in the following diagram:

| C.C. 1-3<br>Student Number | C.C. 4-6<br>A.C.E. | C.C. 7-8<br>Book. 20 | C.C. 9-10<br>Acc. 30 | C.C. 11-12<br>English 30 | C.C. 13-14<br>Social Studies 30 | C.C. 15-16<br>Math 30 | C.C. 17-18<br>Foreign Lang. 30 | C.C. 19-20<br>Science 30 Average | | C.C. 77-78<br>Acc. 200 Mid-session | C.C. 79-80<br>Acc. 200 Final |
|---|---|---|---|---|---|---|---|---|---|---|---|

The analysis was conducted through the Division of Educational Research Services and the data were processed at the Computing Science Centre at the University of Alberta. Two main methods of analysis were used: (1) analysis of covariance to test the hypotheses included in Part A, and (2) stepwise multiple regression to test the hypotheses included in Part B.

The first method, the analysis of covariance, designed to eliminate the effect of a covariate from the criterion, was selected

because it was postulated that intelligence would affect achievement in Accounting 200. This program provided the means, beta weights, variance, residual variance and multiple correlation for each of the groups tested. The program was designed to test the significance of the difference of the covariate intelligence between the two groups and then to adjust the criterion to remove the effect of the covariate regardless of whether the difference was significant or not. An adjusted analysis of variance was then provided. The significance of the difference between variances was tested using the conventional F test. Although the F test was used, the results would have been the same had a t test been used for testing the significance of the difference between means for independent samples. According to Ferguson:

> If the variation cannot be attributed to sampling error we reject the null hypotheses and accept the alternative hypotheses that the treatments applied are having an effect. With only two means, K = 2, this approach leads to the same results as that obtained from the t test for the significance of the difference between means for independent samples.[1]

The F test was used instead of the t test because a computer program employing the F test was available.

An examination of the data to determine the size of each group revealed that thirteen students had two years of high school bookkeeping; eighty-seven students had one year of high school bookkeeping and 724 students had no high school bookkeeping. Comparisons of these

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[1]George A. Ferguson, Statistical Analysis in Psychology and Education, (New York: McGraw-Hill Book Company), p. 281.

groups on both the mid-session and final marks were made as follows:

1. Group A Those who had taken no bookkeeping in high school. N = 724.

   Group B Those who had taken one or more years of bookkeeping instruction in high school. N = 100.

2. Group A Those who had taken no bookkeeping in high school. N = 724.

   Group B Those who had taken one year of bookkeeping in high school. N = 87.

3. Group A Those who had taken no bookkeeping in high school. N = 724.

   Group B Those who had taken two years of bookkeeping in high school. N = 13.

4. Group A Those who had taken one year of bookkeeping in high school. N = 87.

   Group B Those who had taken two years of bookkeeping in high school. N = 13.

The second method of analysis used was that of stepwise multiple regression by means of which the hypotheses in Part B were tested. This program is designed to provide the means, variances, and standard deviations of all predictor variables and criterion variables, and a correlation coefficients matrix showing the relationship between all variables. At each step the accumulated variance, the beta weights and constants associated with each variable are provided enabling the development of multiple regression equations. In using three runs in this analysis a different number of predictors and, consequently, a different N were employed. The correlation of each predictor with both the mid-session and the final Accounting 200 mark was determined. The predictors and N used in the three separate runs were as follows:

1. A.C.E., English 30, Social Studies 30, Mathematics 30, Foreign Language 30, Science 30 Average, Five-Departmental Average, Bookkeeping 20 and Accounting 30. N = 12.
2. A.C.E., English 30, Social Studies 30, Mathematics 30, Foreign Language 30, Science 30 Average, Five-Departmental Average, Bookkeeping 20. N = 91.
3. A.C.E., English 30, Social Studies 30, Mathematics 30, Foreign Language 30, Science 30 Average and Five-Departmental Average. N = 755.

# CHAPTER IV

## THE FINDINGS OF THE STUDY

The results of the analysis of the data are presented in this chapter. Each null hypothesis of Parts A and B is stated and followed by the appropriate test and a brief interpretation.

### PART A: RESULTS OF COVARIANCE ANALYSIS

Hypothesis 1(a). There is no significant difference in the adjusted Accounting 200 mid-session marks between students who have had one or more years of bookkeeping instruction in high school and students who have had no bookkeeping instruction in high school.

Group A N = 724. These students have had no instruction in bookkeeping in high school.

Group B N = 100. These students have had one or more years of bookkeeping instruction in high school.

For the first hypothesis, the results of the analysis of variance before the adjustment for I.Q. are presented for illustrative purposes; in subsequent reportings the only before-adjustment data presented are the means of the two groups.

The mean Accounting 200 mid-session mark before adjustment was 50.37 for Group A and 55.93 for Group B. According to Table I the difference in achievement between the two groups was significant beyond the .001 level. However, as was stated previously, perhaps

the difference in achievement can be attributed to the covariate I.Q. and not to bookkeeping instruction.

TABLE I

ANALYSIS OF VARIANCE FOR COMPARISON OF MID-SESSION ACCOUNTING 200 MARKS PRIOR TO A.C.E. ADJUSTMENT BETWEEN GROUP A (N = 724) AND GROUP B (N = 100)

| Source of Variation | df | Sums of Squares | Mean Squares |
|---|---|---|---|
| Group | 1 | 2714.69 | 2714.69 |
| Within | 822 | 193799.59 | 235.77 |
| Total | 823 | 196514.28 | |

F = 11.51 P = .00076

The next step was to test the significance of the difference in A.C.E. scores between the two groups. The mean A.C.E. score was 118.60 for Group A and 118.86 for Group B. According to Table II this difference was not significant. Although the difference was not significant, adjusted means were calculated for the two groups and their adjusted means then provided the basis for the analysis of variance. The adjusted mean mid-session Accounting 200 mark was 50.38 for Group A and 55.89 for Group B. According to Table III the difference after adjustment was still significant beyond the .001 level. Therefore, hypothesis 1(a) must be rejected. Students who have taken one or more years of bookkeeping instruction in high school did

achieve higher Accounting 200 mid-session marks than did students who had no bookkeeping instruction in high school.

TABLE II

ANALYSIS OF VARIANCE FOR COMPARISON OF A.C.E. SCORES BETWEEN GROUP A (N = 724) AND GROUP B (N = 100)

| Source of Variation | df | Sums of Squares | Mean Squares |
|---|---|---|---|
| Group | 1 | 6.125 | 6.125 |
| Within | 822 | 247122.62 | 300.636 |
| Total | 823 | 247128.75 | |

F = 2.037 P = .89

TABLE III

ADJUSTED ANALYSIS OF VARIANCE FOR COMPARISON OF ACCOUNTING 200 MID-SESSION MARKS BETWEEN GROUP A (N = 724) AND GROUP B (N = 100)

| Source of Variation | df | Mean Squares |
|---|---|---|
| Group | 1 | 2665.90 |
| Within | 821 | 225.25 |

Adjusted F = 11.84 P = .00064

Hypothesis 1(b). There is no significant difference in the Accounting 200 final marks between students who have had one or more years of bookkeeping instruction in high school and those who have had no bookkeeping instruction in high school.

The same groups were employed for hypothesis 1(b) as those used for hypothesis 1(a). The mean Accounting 200 final mark before adjustment was 58.00 for Group A and 63.14 for Group B. After adjustment the mean was 58.00 for Group A and 63.11 for Group B. According to Table IV the difference in achievement between the two groups was significant beyond the .001 level. Therefore, hypothesis 1(b) was rejected. Students who have had one or more years of bookkeeping instruction in high school did achieve higher Accounting 200 final marks than did students who have had no bookkeeping instruction in high school.

TABLE IV

ADJUSTED ANALYSIS OF VARIANCE FOR COMPARISON OF ACCOUNTING 200 FINAL MARKS BETWEEN GROUP A (N = 724) AND GROUP B (N = 100)

| Source of Variation | df | Mean Squares |
|---|---|---|
| Group | 1 | 2293.92 |
| Within | 821 | 173.20 |

Adjusted F = 13.24 P = .00031

Hypothesis 2(a). There is no significant difference in the adjusted Accounting 200 mid-session marks between students who have had one year of bookkeeping instruction in high school and students who have had no bookkeeping instruction in high school.

Group A N = 724. These students have had no bookkeeping instruction in high school.

Group B N = 87. These students have had one year of bookkeeping instruction in high school.

The mean Accounting 200 mid-session mark before adjustment was 50.37 for Group A and 55.53 for Group B. After adjustment the mean was 50.36 for Group A and 55.60 for Group B. According to Table V the difference in achievement between the two groups was significant beyond the .01 level. Therefore, hypothesis 2(a) was rejected. Students who have had one year of bookkeeping instruction in high school did achieve higher Accounting 200 mid-session marks than did students who have had no bookkeeping instruction in high school.

TABLE V

ADJUSTED ANALYSIS OF VARIANCE FOR COMPARISON OF ACCOUNTING 200 MID-SESSION MARKS BETWEEN GROUP A (N = 724) AND GROUP B (N = 87)

| Source of Variation | df | Mean Squares |
|---|---|---|
| Group | 1 | 2130.04 |
| Within | 808 | 226.83 |

Adjusted F = 9.39 P = .00231

Hypothesis 2(b). There is no significant difference in the adjusted Accounting 200 final marks between students who have had one year of bookkeeping instruction in high school and students who have had no bookkeeping instruction in high school.

The same groups were employed for hypothesis 2(b) as those for 2(a). The mean Accounting 200 final mark before adjustment was 58.00 for Group A and 62.15 for Group B. After adjustment the mean was 57.99 for Group A and 62.20 for Group B. According to Table VI the difference in achievement between the two groups is significant beyond the .01 level. Therefore, hypothesis 2(b) was rejected. Students who have had one year of bookkeeping instruction in high school did achieve higher Accounting 200 final marks than did students who have had no bookkeeping instruction in high school.

TABLE VI

ADJUSTED ANALYSIS OF VARIANCE FOR COMPARISON OF ACCOUNTING 200 FINAL MARKS BETWEEN GROUP A (N = 724) AND GROUP B (N = 87)

| Source of Variation | df | Mean Squares |
|---|---|---|
| Group | 1 | 1375.02 |
| Within | 808 | 174.68 |

Adjusted F = 7.87 P = .00522

Hypothesis 3(a). There is no significant difference in the adjusted Accounting 200 mid-session marks between students who have

had two years of bookkeeping instruction in high school and students who have had no bookkeeping instruction in high school.

Group A N = 724. These students have had no bookkeeping instruction in high school.

Group B N = 13. These students have had two years of bookkeeping instruction in high school.

The mean Accounting 200 mid-session mark before adjustment was 50.37 for Group A and 58.62 for Group B. After adjustment the mean was 50.39 for Group A and 57.64 for Group B. According to Table VII the difference in achievement between the two groups was not significant at the .05 level. Therefore, hypothesis 3(a) was accepted. There is no significant difference in the adjusted Accounting 200 mid-session marks between students who have had two years of bookkeeping instruction in high school and students who have had no bookkeeping instruction in high school.

TABLE VII

ADJUSTED ANALYSIS OF VARIANCE FOR COMPARISON OF ACCOUNTING 200 MID-SESSION MARKS BETWEEN GROUP A (N = 724) AND GROUP B (N = 13)

| Source of Variation | df | Mean Squares |
|---|---|---|
| Group | 1 | 671.42 |
| Within | 734 | 224.93 |

Adjusted F = 2.98 P = .08405

Hypothesis 3(b). There is no significant difference in the adjusted Accounting 200 final marks between students who have had two years of bookkeeping instruction in high school and students who have had no bookkeeping instruction in high school.

The same groups were employed for hypothesis 3(b) as those for 3(a). The mean Accounting 200 final mark before adjustment was 58.00 for Group A and 69.77 for Group B. After adjustment the mean was 58.01 for Group A and 69.11 for Group B. According to Table VIII the difference in achievement between the two groups is significant beyond the .05 level. Therefore, hypothesis 3(b) was rejected. Students who have had two years of bookkeeping instruction in high school did achieve higher Accounting 200 final marks than did students who have had no bookkeeping instruction in high school.

TABLE VIII

ADJUSTED ANALYSIS OF VARIANCE FOR COMPARISON OF ACCOUNTING 200 FINAL MARKS BETWEEN GROUP A (N = 724) AND GROUP B (N = 13)

| Source of Variation | df | Mean Squares |
|---|---|---|
| Group | 1 | 1572.44 |
| Within | 734 | 176.34 |

Adjusted F = 8.92 P = .00297

Hypothesis 4(a). There is no significant difference in the adjusted Accounting 200 mid-session marks between students who have

had two years of bookkeeping instruction in high school and students who have had one year of bookkeeping instruction in high school.

Group A N = 87. These students have had one year of high school bookkeeping instruction.

Group B N = 13. These students have had two years of high school bookkeeping instruction.

The mean Accounting 200 mid-session mark before adjustment was 55.53 for Group A and 58.62 for Group B. After adjustment the mean was 55.57 for Group A and 58.32 for Group B. According to Table IX the difference in achievement between the two groups is not significant at the .05 level. Therefore, hypothesis 4(a) was accepted. There is no significant difference in the adjusted Accounting 200 mid-session marks between students who have had two years of bookkeeping instruction in high school and students who have had one year of bookkeeping instruction in high school.

TABLE IX

ADJUSTED ANALYSIS OF VARIANCE FOR COMPARISON OF ACCOUNTING 200 MID-SESSION MARKS BETWEEN GROUP A (N = 87) AND GROUP B (N = 13)

| Source of Variation | df | Mean Squares |
|---|---|---|
| Group | 1 | 84.53 |
| Within | 97 | 215.99 |

Adjusted F = .39 P = .53304

Hypothesis 4(b). There is no significant difference in the adjusted Accounting 200 final marks between students who have had two years of bookkeeping instruction in high school and students who have had one year of bookkeeping instruction in high school.

The same groups were employed for hypothesis 4(b) as those for 4(a). The mean Accounting 200 final mark before adjustment was 62.15 for Group A and 69.77 for Group B. After adjustment the mean was 62.19 for Group A and 69.51 for Group B. According to Table X the difference in achievement between the two groups is significant beyond the .05 level. Therefore, hypothesis 4(b) was rejected. Students who have had two years of bookkeeping instruction in high school did achieve higher Accounting 200 final marks than did students who have had only one year of bookkeeping instruction in high school.

TABLE X

ADJUSTED ANALYSIS OF VARIANCE FOR COMPARISON OF ACCOUNTING 200 FINAL MARKS BETWEEN GROUP A (N = 87) AND GROUP B (N = 13)

| Source of Variation | df | Mean Squares |
|---|---|---|
| Group | 1 | 599.45 |
| Within | 97 | 129.82 |

Adjusted F = 4.6174 P = .03414

PART B: RESULTS OF STEPWISE MULTIPLE REGRESSION ANALYSIS

Hypothesis 5(a). Including Bookkeeping 20 and Accounting 30 as predictors, there is no significant correlation, at the .05 level, between the Accounting 200 mid-session mark and marks in the following:

(1) A.C.E.
(2) Bookkeeping 20
(3) Accounting 30
(4) English 30
(5) Social Studies 30
(6) Mathematics 30
(7) Foreign Language 30
(8) Science 30 Average
(9) Five-Departmental Average

The means, variance and standard deviations for scores on the nine predictor variables and two criteria variables are given in Table XI. With N = 12 a correlation of + .532 is required for significance at the .05 level. The required correlation is high because N is small. Complete data were available for only twelve students when all predictors, including Accounting 30, were utilized in the analysis. According to Table XII none of the predictor variables reached a correlation of .532 with the criterion, Accounting 200 mid-session mark. Therefore, hypothesis 5(a) was accepted.

Hypothesis 5(b). Including Bookkeeping 20 and Accounting 30 as predictors, there is no significant correlation, at the .05 level, between the Accounting 200 final mark and marks in the following:

(1) A.C.E.
(2) Bookkeeping 20
(3) Accounting 30
(4) English 30
(5) Social Studies 30
(6) Mathematics 30
(7) Foreign Language 30
(8) Science 30 Average
(9) Five-Departmental Average

TABLE XI

MEANS, VARIANCE AND STANDARD DEVIATIONS FOR SCORES ON NINE PREDICTOR VARIABLES AND TWO CRITERIA VARIABLES; N = 12

| Predictor Variables | Means | Variance | Standard Deviations |
|---|---|---|---|
| 1. A.C.E | 121.42 | 98.27 | 9.91 |
| 2. Bookkeeping 20 | 79.58 | 56.63 | 7.53 |
| 3. Accounting 30 | 76.67 | 133.33 | 11.55 |
| 4. English 30 | 65.25 | 108.75 | 10.43 |
| 5. Social Studies 30 | 68.67 | 140.06 | 11.83 |
| 6. Mathematics 30 | 66.58 | 44.99 | 6.71 |
| 7. Foreign Language 30 | 66.50 | 256.27 | 16.01 |
| 8. Science 30 Average | 68.83 | 84.52 | 9.19 |
| 9. Five-Dept. Average | 67.17 | 59.08 | 7.69 |
| Criterion Variables | | | |
| Acc. 200 Mid-session | 58.00 | 147.64 | 12.15 |
| Acc. 200 Final | 69.25 | 49.84 | 7.06 |

TABLE XII

THE CORRELATION COEFFICIENTS OF NINE PREDICTOR VARIABLES WITH EACH OF TWO CRITERION VARIABLES AND WITH ONE ANOTHER; N = 12

| Predictor | Book. 20 | Acc. 30 | English 30 | Social Studies 30 | Math 30 | Foreign Language 30 | Science 30 Average | Five-Dept. Average | Acc. 200 Mid-session | Acc. 200 Final |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. A.C.E. | .258 | .295 | .469 | .125 | .043 | .022 | .109 | .208 | .131 | .295 |
| 2. Bookkeeping 20 | | .767 | .627 | .784 | .447 | .489 | .577 | .831 | .099 | .336 |
| 3. Accounting 30 | | | .487 | .500 | .274 | .460 | .422 | .627 | .006 | .374 |
| 4. English 30 | .535 | .028 | .711 | .339 | .818 | .414 | .262 | | | |
| 5. Social Studies 30 | | .216 | .402 | .613 | .805 | .002 | .062 | | | |
| 6. Mathematics 30 | | | .094 | .375 | .377 | .135 | .081 | | | |
| 7. Foreign Language 30 | | | | .060 | .764 | .179 | .265 | | | |
| 8. Science 30 Average | | | | | .610 | .491 | .411 | | | |
| 9. Five-Departmental Average | | | | | | .329 | .313 | | | |
| Criterion | | | | | | | | | | |
| 10. Accounting 200 Mid-session | | | | | | | | | | .468 |
| 11. Accounting 200 Final | | | | | | | | | | |

Again, a correlation of + .532 is required at the .05 level of significance. According to Table XII no predictor variables reached the magnitude required for significance. Therefore, hypothesis 5(b) was accepted.

With N = 12, the reliability of a regression equation is certainly questionable, therefore no such prediction equation is reported here.

Hypothesis 6(a) Excluding Accounting 30 as a predictor, there is no significant correlation, at the .05 level, between the Accounting 200 mid-session mark and marks in the following:

(1) A.C.E.
(2) Bookkeeping 20
(3) English 30
(4) Social Studies 30
(5) Mathematics 30
(6) Foreign Language 30
(7) Science 30 Average
(8) Five-Departmental Average

The means, variance and standard deviations for scores on the eight predictor variables and the two criteria variables are given in Table XIII. With N = 91 a correlation of .204 is required for significance at the .05 level. According to Table XIV Bookkeeping 20, Mathematics 30, Science 30 Average and Five-Departmental Average were significantly correlated with the Accounting 200 mid-session mark. Therefore, hypothesis 6(a) was rejected. The significant correlations were Bookkeeping 20 at .342, Mathematics 30 at .453, Science 30 Average at .456 and Five-Departmental Average at .390.

To develop a regression equation which includes those variables which are the best predictors of the Accounting 200 mid-session mark,

TABLE XIII

MEANS, VARIANCE AND STANDARD DEVIATIONS FOR SCORES ON EIGHT PREDICTOR VARIABLES AND TWO CRITERIA VARIABLES; N = 91

| Predictor Variables | Means | Variance | Standard Deviations |
|---|---|---|---|
| A.C.E. | 118.80 | 244.20 | 15.63 |
| Bookkeeping 20 | 79.74 | 132.15 | 11.50 |
| English 30 | 64.11 | 95.48 | 9.77 |
| Social Studies 30 | 68.74 | 91.77 | 9.58 |
| Mathematics 30 | 67.91 | 81.41 | 9.02 |
| Foreign Language 30 | 63.34 | 114.40 | 10.70 |
| Science 30 Average | 65.55 | 70.49 | 8.40 |
| Five-Departmental Average | 65.93 | 31.20 | 5.59 |
| Criterion Variables | | | |
| Accounting 200 Mid-session | 55.95 | 219.34 | 14.81 |
| Accounting 200 Final | 63.46 | 138.61 | 11.77 |

TABLE XIV

THE CORRELATION COEFFICIENTS OF EIGHT PREDICTOR VARIABLES WITH EACH OF TWO CRITERION VARIABLES AND WITH ONE ANOTHER; N = 91

| Predictor | Book. 20 | English 30 | Social Studies 30 | Math 30 | Foreign Language 30 | Science 30 Average | Five-Dept. Average | Acc. 200 Mid-session | Acc. 200 Final |
|---|---|---|---|---|---|---|---|---|---|
| 1. A.C.E. | .137 | .436 | .225 | -.094 | .094 | .004 | .236 | .074 | .111 |
| 2. Bookkeeping 20 | | .326 | .247 | .170 | .207 | .295 | .422 | .342* | .276* |
| 3. English 30 | .416 | -.060 | .410 | .123 | .667 | .163 | .206* | | |
| 4. Social Studies 30 | | -.125 | .300 | .145 | .607 | -.070 | .029 | | |
| 5. Mathematics 30 | | | .092 | .322 | .391 | .453* | .419* | | |
| 6. Foreign Language 30 | | | | .131 | .698 | .191 | .244* | | |
| 7. Science 30 Average | | | | | .548 | .456* | .391* | | |
| 8. Five-Departmental Average | | | | | | .390* | .428* | | |
| Criterion | | | | | | | | | |
| 9. Accounting 200 Mid-session | | | | | | | | .629 | |
| 10. Accounting 200 Final | | | | | | | | | |

*significant at the .05 level.

the step-wise multiple regression program was utilized. Table XV indicates that with N = 91, the Science 30 Average was the best single predictor of the Accounting 200 mid-session mark accounting for 20.79 per cent of the variance, followed by Mathematics 30 with 10.44 per cant, Bookkeeping 20 with 3.66 per cent, Social Studies with 1.65 per cent and English 30 with 1.95 per cent.

The T of 2.70 indicated that the last variable added, English 30, was significant at the .01 level. The resulting equation was built from the model:

$$\hat{Y} = C + a_1 X_1 + a_2 X_2 + \ldots a_k X_k \text{ where}$$

$\hat{Y}$ is the predicted criterion.

C is the constant associated with a particular set of weighted predictors.

$X_1 - X_k$ are the predictor variables.

$a_1 - a_k$ are the least square weights (beta) associated with each predictor.

Beta weights are used to minimize $\Sigma(Y - \hat{Y})^2$.

The prediction equation for the Accounting 200 mid-session mark based on N = 91 and using the variables given in hypothesis 6(a) was as follows:

$Y = -29.024 + .543X_1 + .503X_2 + .251X_3 - .295X_4 + .242X_5$ where $X_1 - X_5$ are identified in Table XV.

Hypothesis 6(b). Excluding Accounting 30 as a predictor there is no significant correlation, at the .05 level, between the Accounting 200 final mark and marks in the following:

TABLE XV

LAST SIGNIFICANT STEP IN THE STEPWISE MULTIPLE LINEAR REGRESSION ANALYSIS TO DETERMINE THE BEST PREDICTORS OF THE ACCOUNTING 200 MID-SESSION MARK; N = 91

| Variable | Beta Weight | SD Error | T (Beta Wt.) | Variance | T (Predictor) |
|---|---|---|---|---|---|
| Science 30 Average (XI) | .543 | .166 | 3.28 | 20.79 | 4.83 |
| Mathematics 30 (X2) | .503 | .152 | 3.32 | 10.44 | 13.37 |
| Bookkeeping 20 (X3) | .251 | .122 | 2.05 | 3.66 | 4.90 |
| Social Studies 30 (X4) | -.295 | .148 | -1.99 | 1.65 | 2.23 |
| English 30 (X5) | .242 | .147 | 1.64 | 1.95 | 2.70 |
| | | | Total | 38.50 | |

Constant -29.024

SIGNIFICANCE OF REGRESSION

| Source | Sums of Squares | Mean Squares | df |
|---|---|---|---|
| Regression | 7600.37 | 1520.07 | 5 |
| Error | 12140.36 | 142.83 | 85 |
| Total | 19740.73 | | |

F = 10.64 P = .00000

(1) A.C.E.
(2) Bookkeeping 20
(3) English 30
(4) Social Studies 30
(5) Mathematics 30
(6) Foreign Language 30
(7) Science 30 Average
(8) Five-Departmental Average

According to Table XIV, Bookkeeping 20, English 30, Mathematics 30, Foreign Language 30, Science 30 Average and Five-Departmental Average are significantly correlated with Accounting 200 final marks. Therefore, hypothesis 6(b) was rejected.

The significance level required for these correlations was .204. The significant correlations with Accounting 200 final marks were: Bookkeeping 20 at .276, English 30 at .206, Mathematics 30 at .419, Foreign Language 30 at .244, Science 30 Average at .391 and Five-Departmental Average at .428. According to Table XVI the best predictors of the Accounting 200 final mark were: Mathematics 30, Science 30 Average and English 30, with variance accounted for of 17.53 per cent, 7.34 per cent and 3.73 per cent respectively. The prediction equation for the Accounting 200 final mark, based on N = 91 and using the variables given in hypothesis 6(b) was as follows:

$\hat{Y} = -5.95 + .455X_1 + .357X_2 + .236X_3$ where $X_1$ to $X_3$ are indicated in Table XVI.

Hypothesis 7(a). Excluding Bookkeeping 20 and Accounting 30 as predictors, there is no significant correlation, at the .05 level, between the Accounting 200 mid-session mark and marks in the following:

(1) A.C.E.
(2) English 30
(3) Social Studies 30
(4) Mathematics 30

TABLE XVI

LAST SIGNIFICANT STEP IN THE STEPWISE MULTIPLE LINEAR REGRESSION ANALYSIS TO DETERMINE THE BEST PREDICTORS OF THE ACCOUNTING 200 FINAL MARK; N = 91

| Variable | Beta Weight | SD Error | T (Beta Wt.) | Variance | T (Predictor) |
|---|---|---|---|---|---|
| Mathematics 30 (X1) | .455 | .126 | 3.62 | 17.53 | 4.35 |
| Science 30 Average (X2) | .357 | .136 | 2.63 | 7.34 | 8.60 |
| English 30 (X3) | .236 | .111 | 2.13 | 3.73 | 4.54 |
| | | | Total | 28.60 | |

Constant -5.95

SIGNIFICANCE OF REGRESSION

| Source | Sums of Squares | Mean Squares | df |
|---|---|---|---|
| Regression | 3567.14 | 1189.05 | 3 |
| Error | 8907.47 | 102.38 | 87 |
| Total | 12474.61 | | |

F = 11.61 P = .00002

(5) Foreign Language 30

(6) Science 30 Average

(7) Five-Departmental Average

The means, variance and standard deviations for scores on the seven predictor variables and the two criteria variables are provided in Table XVII. With N = 755 the level of significance required for these correlations is .075. Because all predictors were significantly correlated with the Accounting 200 mid-session mark hypothesis 7(a) was rejected. The regression analysis provided in Table XIX indicated that the best predictor of the Accounting 200 mid-session mark was Mathematics 30, followed by Social Studies 30, A.C.E. and Science 30 Average. Mathematics 30 provided 6.24 per cent of the accumulated variance, followed by Social Studies 30 with 4.63 per cent, A.C.E. with 2.04 per cent and Science 30 Average with .57 per cent.

The prediction equation for Accounting 200 mid-session mark based on N = 755 and using the variables given in hypothesis 7(a) was as follows:

$\hat{Y} = -15.124 + .304X_1 + .268X_2 + .138X_3 + .173X_4$ where

$X_1 - X_4$ are identified in Table XIX.

Hypothesis 7(b). Excluding Bookkeeping 20 and Accounting 30 as predictors, there is no significant correlation, at the .05 level, between the Accounting 200 final mark and marks in the following:

(1) A.C.E.

(2) English 30

(3) Social Studies 30

(4) Mathematics 30

(5) Foreign Language 30

(6) Science 30 Average

(7) Five-Departmental Average

TABLE XVII

MEANS, VARIANCE AND STANDARD DEVIATIONS FOR SCORES ON SEVEN PREDICTOR VARIABLES AND TWO CRITERIA VARIABLES; N = 755

| Predictor Variables | Means | Variance | Standard Deviations |
|---|---|---|---|
| A.C.E. | 118.88 | 285.54 | 16.90 |
| English 30 | 64.19 | 78.27 | 8.85 |
| Social Studies 30 | 68.62 | 82.43 | 9.08 |
| Mathematics 30 | 66.66 | 90.45 | 9.51 |
| Foreign Language 30 | 63.25 | 99.37 | 9.97 |
| Science 30 Average | 65.76 | 56.15 | 7.49 |
| Five-Departmental Average | 65.69 | 32.02 | 5.66 |
| Criterion Variables | | | |
| Accounting 200 Mid-session | 51.34 | 237.78 | 15.42 |
| Accounting 200 Final | 58.79 | 181.75 | 13.48 |

With N = 755 the level of significance required for these correlations was .075 and according to Table XVIII all the predictors were significantly correlated, therefore hypothesis 7(b) was rejected. The regression analysis provided in Table XX indicated that the best predictors of the Accounting 200 final mark were the Mathematics 30 with 7.51 per cent of the variance, followed by Social Studies 30 with 4.81 per cent, A.C.E. with .95 per cent and Science 30 Average with .19 per cent.

The prediction equation for the Accounting 200 final mark based on N = 755 and using the variables given in hypothesis 7(b) was as follows:

$$\hat{Y} = 3.196 + .321X_1 + .272X_2 + .082X_3 + .088X_4 \text{ where}$$

$X_1$ - $X_4$ are identified in Table XX.

The predictors selected for the Accounting 200 mid-session mark were exactly the same as those selected to predict the Accounting 200 final mark. In addition, the predictors were selected in the same order.

TABLE XVIII

THE CORRELATION COEFFICIENTS OF SEVEN PREDICTOR VARIABLES WITH EACH OF TWO CRITERION VARIABLES AND WITH ONE ANOTHER; N = 755

| Predictor | English 30 | Social Studies 30 | Math 30 | Foreign Language 30 | Science 30 Average | Five-Dept. Average | Acc. 200 Mid-session | Acc. 200 Final |
|---|---|---|---|---|---|---|---|---|
| 1. A.C.E. | .434 | .247 | .105 | .085 | .061 | .296 | .215* | .175* |
| 2. English 30 | | .410 | .128 | .311 | .200 | .650 | .177* | .167* |
| 3. Social Studies 30 | | | .106 | .237 | .304 | .649 | .240* | .247* |
| 4. Mathematics 30 | | | | .199 | .353 | .573 | .250* | .274* |
| 5. Foreign Language 30 | | | | | .231 | .654 | .124* | .126* |
| 6. Science 30 Average | | | | | | .624 | .207* | .190* |
| 7. Five-Departmental Average | | | | | | | .315* | .318* |
| Criterion | | | | | | | | |
| 8. Accounting 200 Mid-session | | | | | | | | .706 |
| 9. Accounting 200 Final | | | | | | | | |

*significant at the .05 level.

TABLE XIX

LAST SIGNIFICANT STEP IN THE STEPWISE MULTIPLE LINEAR REGRESSION ANALYSIS TO DETERMINE THE BEST PREDICTORS OF THE ACCOUNTING 200 MID-SESSION MARK; N = 755

| Variable | Beta Weight | SD Error | T (Beta Wt.) | Variance | T (Predictor) |
|---|---|---|---|---|---|
| Mathematics 30 (X1) | .304 | .059 | 5.15 | 6.24 | 7.08 |
| Social Studies 30 (X2) | .268 | .062 | 4.29 | 4.63 | 39.06 |
| A.C.E. (X3) | .138 | .032 | 4.30 | 2.04 | 17.59 |
| Science 30 Average (X4) | .173 | .078 | 2.22 | .57 | 4.92 |
| | | | Total | 13.48 | |

Constant -15.124

SIGNIFICANCE OF REGRESSION

| Source | Sums of Squares | Mean Squares | df |
|---|---|---|---|
| Regression | 24165.27 | 6041.32 | 4 |
| Error | 155119.29 | 206.83 | 750 |
| Total | 179284.56 | | |

F .9.21 P = .00000

TABLE XX

LAST SIGNIFICANT STEP IN THE STEPWISE MULTIPLE LINEAR REGRESSION ANALYSIS TO DETERMINE THE BEST PREDICTORS OF THE ACCOUNTING 200 FINAL MARK; N = 755

| Variable | Beta Weight | SD Error | T (Beta Wt.) | Variance | T (Predictor) |
|---|---|---|---|---|---|
| Mathematics 30 (X1) | .321 | .052 | 6.22 | 7.51 | 7.82 |
| Social Studies 30 (X2) | .272 | .055 | 4.98 | 4.81 | 41.26 |
| A.C.E. (X3) | .082 | .028 | 2.93 | .95 | 8.23 |
| Science 30 Average (X4) | .088 | .068 | 1.28 | .19 | 1.65 |
| | | | Total | 13.46 | |

Constant 3.196

SIGNIFICANCE OF REGRESSION

| Source | Sums of Squares | Mean Squares | df |
|---|---|---|---|
| Regression | 18447.29 | 4611.82 | 4 |
| Error | 118594.24 | 158.13 | 750 |
| Total | 137041.53 | | |

F = 29.17 P = .00000

# CHAPTER V

## SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The summary and conclusions presented in this chapter are reported in two sections. Part A includes the summary and conclusions related to the determination of the effect of prior bookkeeping instruction upon achievement in university elementary accounting; Part B includes the summary and conclusions related to the selection of predictors of university elementary accounting.

## PART A: SUMMARY AND CONCLUSIONS

One of the purposes of this study was to determine whether students who had received bookkeeping instruction in high school achieved higher marks in Accounting 200 at the University of Alberta than did students who had not received such prior high school bookkeeping instruction. Accounting 200 students enrolled at the University of Alberta from 1959 to 1964 were used as the population. Of the 824 students included in the study thirteen students had received two years of high school bookkeeping instruction, eighty-seven students had received one year of high school bookkeeping instruction and 724 students had received no high school bookkeeping instruction. Because of the suggestion in related literature that prior bookkeeping instruction would assist elementary accounting students only in the first part of the course but would be of no benefit later, not only the final marks but also the mid-session marks in Accounting 200 were obtained. In order to partial out the effect of intelligence the

analysis of covariance method was employed which provided adjusted Accounting 200 marks.

A summary of the results follows:

1. Those students who had received one or more years of high school bookkeeping instruction had an adjusted mean of 5.51 and 5.11 percentage points higher on their mid-session and final Accounting 200 marks than did those students who had received no bookkeeping instruction in high school. Both tests indicated significance beyond the .001 level.
2. Those students who had received one year of high school bookkeeping instruction had an adjusted mean of 5.24 and 4.21 percentage points higher on their mid-session and final Accounting 200 marks than did those students who had received no bookkeeping instruction in high school. These tests indicated significance beyond the .005 level.
3. Those students who had received two years of bookkeeping instruction in high school had an adjusted mean of 7.25 percentage points higher on the Accounting 200 mid-session mark than did those students who had received no high school bookkeeping instruction but this was not significant at the .05 level. Because only thirteen students had taken two years of high school bookkeeping a considerable difference in the means of the two groups would have to exist before significance could be achieved. Those students who had received two years of bookkeeping instruction in high school had an adjusted mean of 11.10 percentage points higher on the Accounting 200 final marks than did those students who had

received no bookkeeping instruction in high school. This test indicated significance beyond the .005 level.

4. Those students who had received two years of high school bookkeeping instruction had an adjusted mean of 2.75 percentage points higher on the Accounting 200 mid-session marks than did those students who had received only one year of high school bookkeeping instruction. However, this test was not significant when significance was held at the .05 level. Those students who had received two years of high school bookkeeping instruction had an adjusted mean of 7.32 percentage points higher on the Accounting 200 final marks than did those students who had received one year of high school bookkeeping instruction. This test indicated significance beyond the .05 level.

The findings of the study support the following conclusions:

1. Students who have taken bookkeeping instruction in high school achieve higher marks in Accounting 200 than do students who have not received such instruction.
2. Students who have received two years of bookkeeping instruction in high school achieve higher Accounting 200 final marks than do students who have received only one year of bookkeeping instruction in high school.
3. The effect of prior high school bookkeeping is beneficial to a student not only on his mid-session Accounting 200 examination but also on his final Accounting 200 examination.

## PART B: SUMMARY AND CONCLUSIONS

The second purpose of this study was to determine, from a number of variables, the best predictors of Accounting 200 at the University of Alberta. The factors considered were as follows: A.C.E., Bookkeeping 20, Accounting 30, English 30, Social Studies 30, Mathematics 30, Foreign Language 30, Science 30 Average and Five-Departmental Average. The population of 824 students was the same group used in Part A of this study and consisted of Accounting 200 students enrolled at the University of Alberta from 1959 to 1964. The step-wise multiple regression computer program was used for the analysis.

One problem encountered in this part of the study was that when Accounting 30 was included as a predictor, complete data were available for only twelve students. When Accounting 30 was deleted but Bookkeeping 20 retained as a predictor complete data were available for ninety-one students. With both Accounting 30 and Bookkeeping 20 deleted as predictors complete data were available for 755 students.

In the first run, when all predictors were used, (N = 12), the correlation coefficient required for significance was .532. The magnitude of the correlation coefficient required was caused by the small N. In this run, none of the predictors correlated significantly with the criteria and therefore no further interpretation of the run was given by the researcher.

In the second run, when Accounting 30 was deleted as a predictor, (N = 91), the correlation coefficient required for significance

was .204. Four predictors correlated significantly with the criterion, Accounting 200 mid-session mark. The predictors and their respective correlation coefficients were as follows: Science 30 Average with .456, Mathematics 30 with .453, Five-Departmental Average with .390 and Bookkeeping 20 with .342.

When the regression equation for the Accounting 200 mid-session mark was established, the Science 30 Average was selected as the best predictor. It accounted for 20.79 per cent of the variance. The next best predictors and the amount of variance that was added were Mathematics 30 with 10.44 per cent, Bookkeeping 20 with 3.66 per cent, Social Studies 30 with 1.65 per cent and English 30 with 1.95 per cent. The remaining variables did not contribute significantly to the prediction and therefore are not reported here.

With the Accounting 200 final mark as the criterion, (N = 91), the same four predictors that were significantly correlated with the Accounting 200 mid-session mark again were significantly correlated with the Accounting 200 final mark but two more variables were added. The predictors and their respective correlation coefficients were as follows: Mathematics 30 with .419, Five-Departmental Average with .428, Science 30 Average with .391 and Bookkeeping 20 with .276. In addition, two more predictors, English 30 and Foreign Language 30 produced significant correlations of .206 and .244 respectively. Mathematics 30 however, was selected this time as the best predictor. It accounted for 17.53 per cent of the variance when the regression equation was established. The only other predictors that added significantly to the equation were Science 30 Average with 7.34 per cent of

the variance and English 30 with 3.73 per cent of the variance. Bookkeeping 20 was the third best predictor of the Accounting 200 mid-session mark but it fell to fifth place (not a significant addition to the prediction equation) as a predictor of the Accounting 200 final mark.

In the final run, when both Accounting 30 and Bookkeeping 20 were deleted as predictors, (N = 755), the correlation coefficient required for significance was .075. Because of the large N, a low significance was required and, as a result, all predictors were significantly correlated with both the Accounting 200 mid-session mark and the final mark. The predictors of the Accounting 200 mid-session mark and their respective correlation coefficients were as follows: Five-Departmental Average with .315, Mathematics 30 with .250, Social Studies 30 with .240, A.C.E. with .215, Science 30 Average with .207, English 30 with .177 and Foreign Language 30 with .124. The predictors of the Accounting 200 final mark and their respective correlation coefficients were as follows: Five-Departmental Average with .318, Mathematics 30 with .274, Social Studies 30 with .247, Science 30 Average with .190, A.C.E. with .175, English 30 with .167 and Foreign Language 30 with .126. The only difference in the order of correlations between the mid-session and the final mark predictors was the transposition of A.C.E. and Science 30 Average in the fourth and fifth positions.

The final outcome of the analysis was the establishment of regression equations for the prediction of mid-session and final Accounting 200 marks. The prediction equation developed for the

Accounting 200 mid-session mark was as follows:

$\hat{Y}$ = -15.124 + .304(Math) + .268(Soc.St.) + .138(A.C.E.) + .173(Sci.30Av.)

The variables that added significantly to the regression equation established for the Accounting 200 mid-session mark and the amount of variance that their addition accounted for were as follows: Mathematics 30 with 6.24 per cent, Social Studies 30 with 4.63 per cent, A.C.E. with 2.04 per cent and Science 30 Average with .57 per cent.

The prediction equation developed for the Accounting 200 final mark was as follows:

$\hat{Y}$ = 3.196 + .321(Math) + .272(Soc.St.) + .082(A.C.E.) + .087(Sci.30Av.)

The variables that added significantly to the regression equation established for the Accounting 200 final mark and the amount of variance that their addition accounted for were as follows: Mathematics 30 with 7.51 per cent, Social Studies 30 with 4.81 per cent, A.C.E. with .95 per cent and Science 30 Average with .19 per cent.

The total variance accounted for by the significant predictors was 13.48 per cent on the Accounting 200 mid-session equation and 13.46 per cent on the Accounting 200 final equation. The same predictors were selected for both criteria. Mathematics 30 accounted for the largest portion of the variance followed by Social Studies 30, A.C.E. and Science 30 Average in that order. Not only were the same predictors selected but they maintained their relative position for predicting both criteria, and accounted for approximately the same amount of the total variance. Mathematics 30 and Social Studies 30 accounted for approximately twelve per cent of the variance leaving the other two significant predictors to add very little to the accumulated variance.

# RECOMMENDATIONS

On the basis of the findings presented in this study, the following recommendations are suggested:

1. It appears that students who have a background in high school bookkeeping have a substantial advantage over other students enrolled in Accounting 200 at the University of Alberta. Guidance counsellors and other educators could inform students who wish to elect accounting at university of the relationship between high school bookkeeping and university accounting. The prediction equation developed in this study might enable educators to assist students in making vocational choices.
2. Although students with a high school bookkeeping background achieved significantly higher Accounting 200 marks than did those without such background, the correlation between high school bookkeeping marks and Accounting 200 marks was not large. Perhaps the mark assigned to high school bookkeeping students does not assess adequately that characteristic which enables a high school bookkeeping graduate to succeed in university elementary accounting. Further investigation is required in this area.
3. A study should be made to determine the areas of similarity in content between high school bookkeeping courses and university elementary accounting. A comparison should also be made of the instructional approach used in high school bookkeeping courses with that used in university elementary accounting.
4. A further study should be conducted to verify the validity of the

regression equations developed in this research.

5. A survey should be conducted of Accounting 200 students who have had prior bookkeeping instruction to obtain students' reasons for stating that prior bookkeeping was, or was not, of assistance.
6. A further survey of Accounting 200 students could be conducted to determine the source of their difficulties in the Accounting 200 course.
7. An analysis should be made of the following examination papers to determine the proportion in each examination that is devoted to the various classifications as outlined in Bloom's[1] Taxonomy:
   (a) Accounting 200 mid-session and final examinations;
   (b) Final examinations in the departmental subjects used in this study;
   (c) Standardized bookkeeping and accounting tests used in Alberta high schools.

[1]Benjamin S. Bloom, Taxonomy of Educational Objectives, Handbook 1, (Toronto: Longmans, Green and Company, 1956), p. 18.

# BIBLIOGRAPHY

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## BOOKS


Bernstein, Allen L. A Handbook of Statistics Solutions for the Behavioral Sciences. Toronto: Holt, Rinehart and Winston Inc., 1964.

Bloom, Benjamin S. Taxonomy of Educational Objectives, Handbook 1, Toronto: Longmans, Green and Company, 1956.

Ezekiel, Mordecai and Fox, Karl A. Methods of Correlation and Regression Analysis. New York: John Wiley & Sons, Inc., 1959.

Ferguson, George A. Statistical Analysis in Psychology and Education. Second Edition. Toronto: McGraw-Hill Book Company, 1966.

Guilford, J. P. Fundamental Statistics in Psychology and Education. Fourth Edition. Toronto: McGraw-Hill Book Company, 1965.


## PERIODICALS


Black, Donald B. "The Prediction of Freshman Success in the University of Alberta from Grade XII Departmental Results," Alberta Journal of Educational Research, Volume VI, No. 1, March, 1960.

Black, Donald B. "Validity of Regression Equations After Six Years to Predict Freshman Success in Engineering," Alberta Journal of Educational Research, Volume X, No. 3, September, 1964.

Bower, James B. "Preparation for Advanced Study in Accounting," Business Education Forum, December, 1962.

Devine, John W. "A Comprehensive Analysis, Classification, and Syntheses of Research Findings and Thought on the Teaching of Bookkeeping and Accounting, 1950-1960," The Journal of Business Education, Volume XXXIX, October, 1963-64.

Herring, J. Virgil. "Research Findings Relative to Students Achievement in Bookkeeping and Accounting," Business Education Forum, Volume VIII, No. 1, October, 1953.

Herring, J. Virgil. "Research in Teaching Bookkeeping and Accounting," Journal of Business Education, Volume XXVI, No. 9, May, 1951.

House, F. Wayne. "Bookkeeping Achievement as Related to Six Possible Factors for Prognosis," The National Business Education Quarterly, Volume XXIII, No. 3, March, 1955.

Howard, Alva. "The Relation of High School Bookkeeping to College Accounting," The Balance Sheet, October, 1963.

Lanham, James S. "Should Bookkeeping Be Taught to College Bound Students," Business Education Forum, Volume XII, No. 3, December, 1957.

Lewis, John W. "Utilizing the Stepwise Multiple Regression Procedure in Selecting Predictor Variables by Sex Group," Educational and Psychological Measurement, Volume XXII, No. 2, 1962.

Mack, Lawrence L. "Examining the Efficiency of Predictors Presently Being Used at the University of Alberta," Alberta Journal of Educational Research, Volume IX, No. 2, June, 1963.

Zacur, Howard A. "A Study of Causes of Drop-Outs From Accounting Courses at the University of Miami," The Journal of Business Education, Volume XXVIII, February, 1953.

## UNPUBLISHED MATERIALS

Aase, Donald A. "The Development of Multiple Regression Equations for the Prediction of Academic Success in Elementary Accounting at the Chico (California) State College." Unpublished Doctoral dissertation, University of North Dakota, Grand Forks, North Dakota, 1959.

Anderson, Esther E. "The Effectiveness of High School Bookkeeping and Shorthand Grades as Indicators of College Success." Unpublished Doctoral dissertation, University of New York, School of Education, 1961.

Barbour, Edna H. "The Effect of the Study of High School Bookkeeping Upon Achievement in Elementary College Accounting." Unpublished Doctoral dissertation, Ohio State University, Columbus, 1955.

Benedict, Margaret Irene. "Criteria for Predicting Shorthand Success." Unpublished Master's thesis, University of Alberta, Edmonton, Alberta, September, 1964.

Campbell, Theodore R. "Grade Nine Marks as Predictor Criteria for Success in Selected Vocational Subjects." Unpublished Master's thesis, University of Alberta, Edmonton, Alberta, September, 1966.

Cannon, Harold L. "Personality Characteristics and Other Factors as Predictors in Achievement in College Elementary Accounting " Unpublished Doctoral dissertation, University of Minnesota, Minneapolis, 1965.

Knowles, Donald W. "The Influence of Faculty, High School Size, and Sex In the Prediction of Freshman Success Using Departmental and Principals' Rating Grade XII Scores." Unpublished Master's thesis, University of Alberta, Edmonton, October, 1964.

Landwehr, Bernard J. "An Analysis of Selected Factors Related To Success in the Study of College Accounting in an Attempt to Establish Minimum Requirements for Accounting Students at West Liberty State College." Unpublished Doctoral dissertation, University of Pittsburgh, Pittsburgh, 1963.

Larson, Tora M. "A Study of Student Personnel Records at East Carolina College as Related To Prediction in Elementary Accounting." Unpublished Doctoral Dissertation, University of Minnesota, Minneapolis, 1957.

Royer, J. Everett. "Selection and Use of Certain Factors Significant in Predicting Achievement of Students in First-Semester Accounting at the University of Miami, 1950-53." Unpublished Doctoral dissertation, University of Indiana, Bloomington, Indiana, 1955.

Thiege, Jack E. "An Analysis of the Prognostic Value of High School Bookkeeping to Elementary College Accounting." Unpublished Master's thesis, Fresno State College, Fresno, California, 1957.

Truckey, Lawrence Andrew. "Comparison of Achievement of Grade Nine Students in Selected Single Grade and Multi-Grade Classes in Alberta." Unpublished Master's thesis, University of Alberta, Edmonton, 1964.

Whiteman, Floyd E. "A Study of the Effect of a Background in College Business Mathematics and High School Bookkeeping Upon Success in College Elementary Accounting." Unpublished Master's thesis, Kansas State Teachers College, Emporia, Kansas, 1963.

Zurowsky, John. "Predicting Freshman Success in Seven Science and Two Business Administration Courses at the University of Alberta." Unpublished Master's thesis, University of Alberta, Edmonton, April, 1959.